



# Potential use of IGDDS and RARS in support of GPM data circulation

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# Purpose of the presentation

- In response to questions on timely access to Metop/MHS data, cost-efficient dissemination means and calibration support
- To report on relevant developments within the WMO Space Programme
  - Access to satellite data
  - Products dissemination
  - Inter-calibration of satellite instruments

# High-level objectives of the WMO Space Programme

WMO focal point for EO satellite matters

Collect, consolidate, update and express **requirements** for space-based observations and related services

**Space agencies**

Support **planning and implementation** of a global space-based observing system meeting WMO requirements

Enhance **users's ability** to benefit from available products and services

**Users**

Global planning, contingency, optimization  
Operational coordination  
**Calibration**  
**Data dissemination and access**

Information on space-based capabilities, data & products  
Training, namely through virtual laboratory development  
Cooperation on tools and methods

# Outline

- Access to MHS data from MetOp
- Status and plan for RARS
- Products dissemination through IGDDS Project
- Additional relevant activity : GSICS

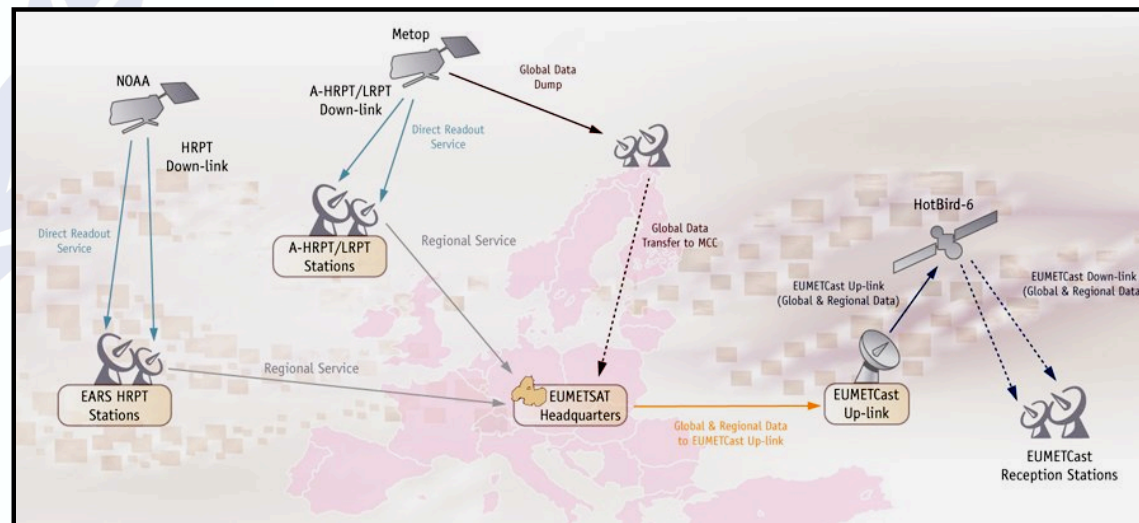
# Access to MHS data from MetOP

- **Direct broadcast**
  - Timeliness : **Real time**
  - Limited area (local acquisition zone)
- **Global data set (stored data)**
  - Timeliness : **135 min (level 1), 180 min (level 2)**
  - Global coverage
- **RARS (Regional ATOVS Retransmission Service)**
  - Timeliness : **30 min (level 1 data)**
  - Regional to Near-global coverage

# Access to global data (I)

## within EUMETSAT METOP Ground Segment

- ATOVS data stored aboard Metop are received in CDA Svalbard, transferred to Darmstadt for processing
- Broadcast via **EUMETCast** (DVB-S)
  - Ku-band over Europe
  - C-Band over Africa and Eastern USA (e.g. NESDIS/Suitland) )(TBC)
- Distributed via **GTS**



# Access to Global data (II)

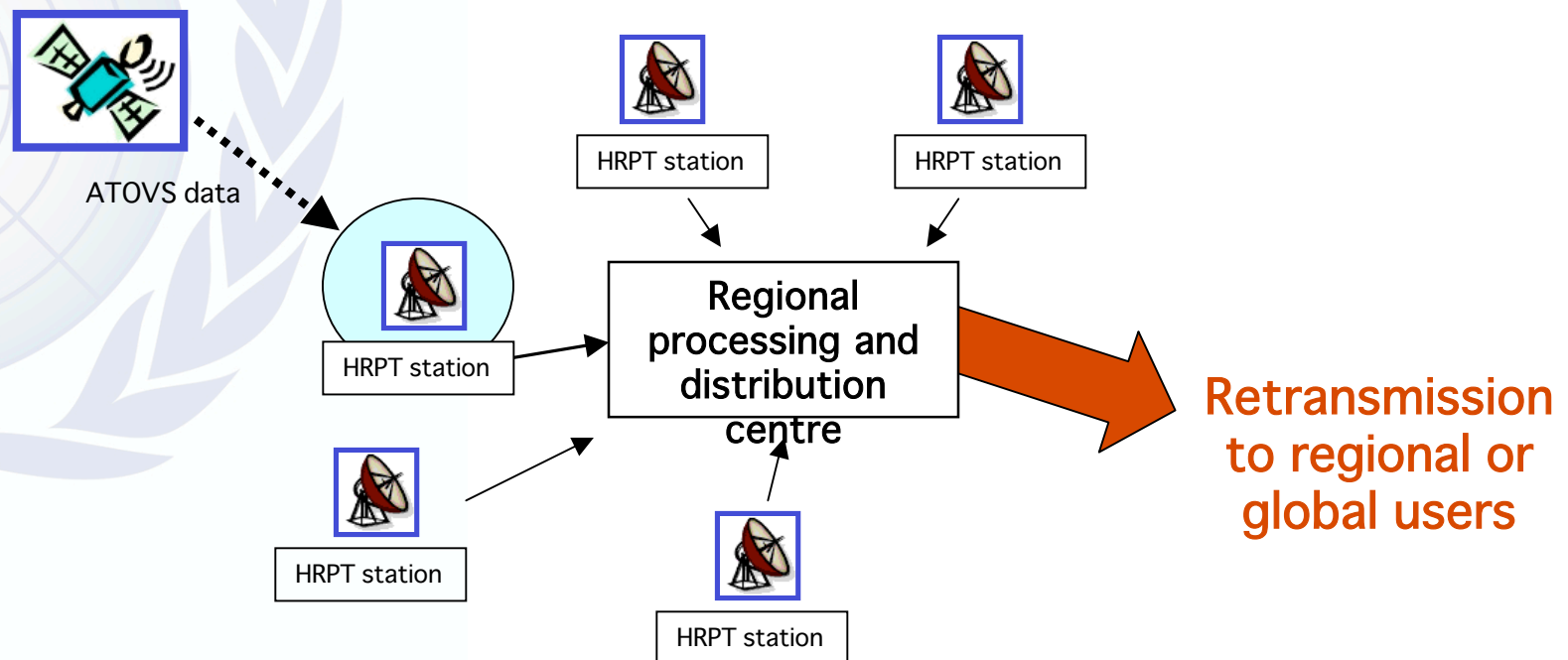
within EUMETSAT METOP Ground Segment

Sensor	EUMETCast Ku-Band (Europe)	EUMETCast C-Band (Africa, East- USA) (TBC)	GTS
AMSU-A	Level 1,2 BUFR format	Level 2 BUFR format	Level 1,2 BUFR format
MHS	Level 1,2 BUFR format	Level 2 BUFR format	Level 1,2 BUFR format
HIRS	Level 1,2 BUFR format	Level 2 BUFR format	Level 1,2 BUFR format

# Regional ATOVS Retransmission Service (RARS)

A WMO project expanding the EUMETSAT EARS concept (2002)

- ATOVS and AVHRR data from NOAA and Metop are collected by several direct readout stations (HRPT) in each region and re-broadcast in near-real time for global and regional users





# RARS requirements and data content

- Global NWP requirements for soundings call for 30 min timeliness (breakthrough), BUFR format and consistency of data calibration.
- RARS data content:
  - AMSU-A
  - AMSU-B (or MHS for NOAA-18 and Metop)
  - HIRS
  - AVHRR on HIRS grid (20.3 km) for local cloud information
- Common pre-processing package AAPP

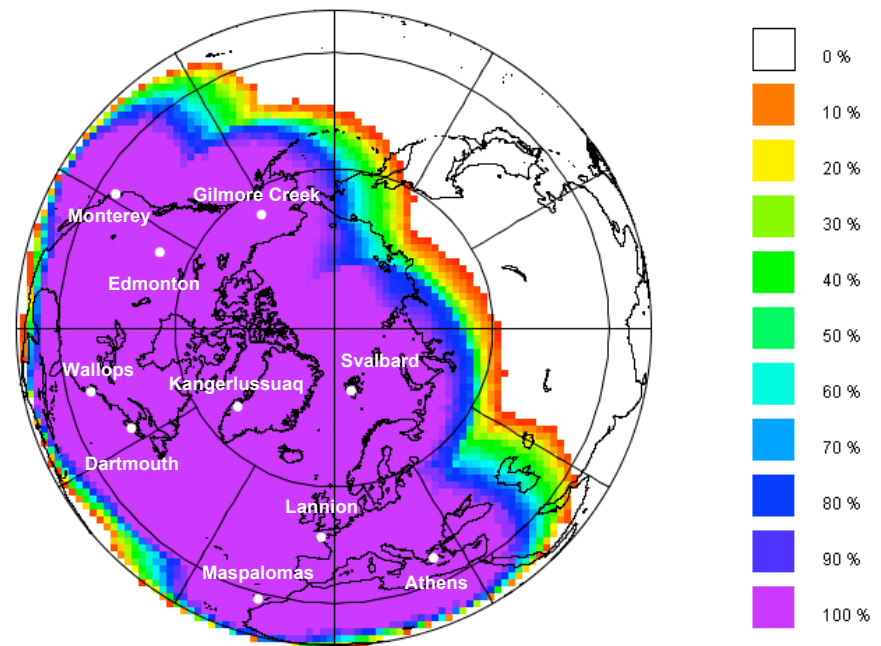
} ATOVS

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# EUMETSAT RARS (EARS) (I)

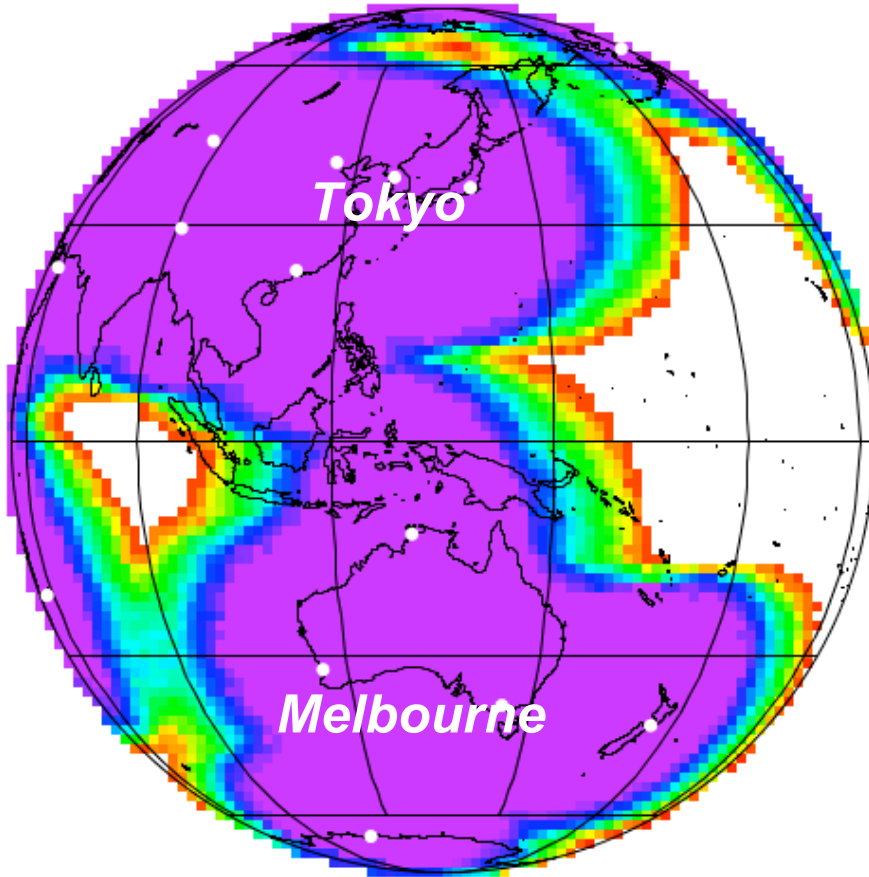
- ATOVS retransmission from 10 HRPT stations
- Additional services :
  - Pilot AVHRR retransmission
  - Pilot collection of ASCAT data
  - Plans for IASI to be refined after Metop commissioning



# EUMETSAT RARS (EARS) (II)

EARS ATOVS	
Product Processing	AAPP as provided by the NWP SAF, configured and run by EUMETSAT.
Product Segmentation	One file per station pass, instrument and processing level.
Products via EUMETCast Ku-Band Europe	<ul style="list-style-type: none"><li>• Level 1a per ATOVS instrument, data in <a href="#">AAPP format</a>, bzip2 compressed.</li><li>• Level 1c per ATOVS instrument, data on original instrument grid, <a href="#">BUFR format</a>.</li><li>• AVHRR derived cloud mask on HIRS instrument grid, <a href="#">BUFR format</a>.</li></ul>
Products via GTS	<ul style="list-style-type: none"><li>• Level 1c per ATOVS instrument, data on original instrument grid, <a href="#">BUFR format</a>.</li></ul>

# Asia-Pacific RARS



- Dissemination via GTS in BUFR format
  - HRPT Stations being upgraded for MetOp
  - Currently involves Australia, China, Japan, Korea,
  - Implementation in progress
- End 2006 : 15 stations
- End 2007 : 22 stations

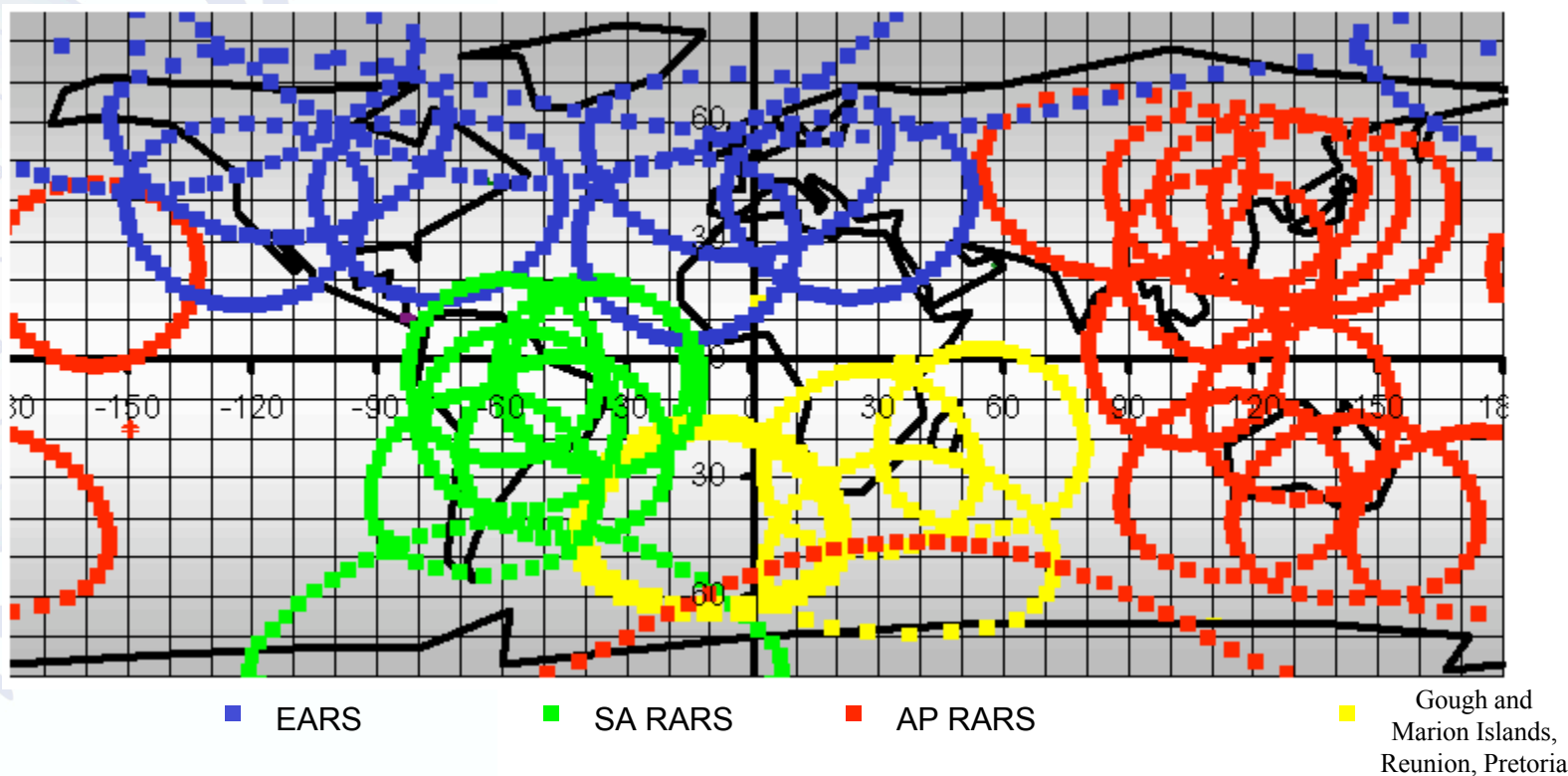
# South-American RARS

- In development and testing phase (software, communications)
- Planned to be fully operational by the **end of 2007**

Processing and distribution centre	HRPT stations planned in 1 <sup>st</sup> stage	Considered expansion
<b>Brazil (INPE)</b>	Fortaleza Natal Cachoeira Paulista Brasilia Manaus Cuiaba	Peru Chile (TBC) Central-America (TBD)
<b>Argentina (CONAE + SMN)</b>	Cordoba	Marambio (Antarctica)

# Towards global coverage

- EARS covers a large part of the Northern hemisphere
- Asia Pacific RARS is starting and South American RARS is a new priority



→ But there are still gaps over Africa and eastern Pacific ...

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# Definition

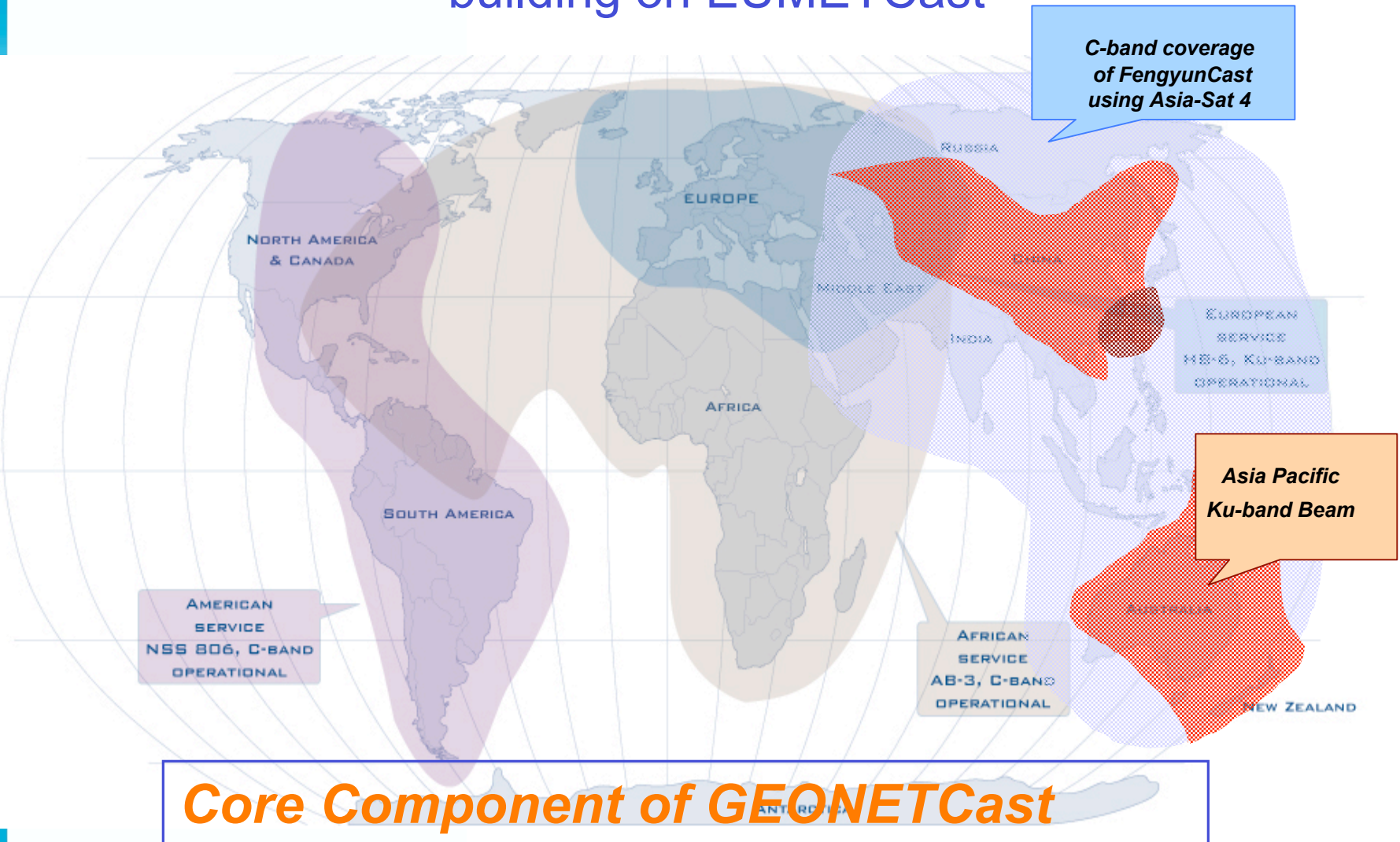
- IGDDS: Integrated Global Data *Dissemination* Service
  - The WMO project ensuring that satellite data and products are made available worldwide in a timely and cost-efficient manner, within the WMO Information System
  - Aims at end to end performances involving the following functions :
    - Data acquisition
    - Data dissemination (PUSH)
    - Data access (PULL)
    - Data and user management

# Advantages of DVB-S for data dissemination

- Commercially available, **low cost** and **easy-to-operate** user receiving devices
- **One-stop shop** : integrated system for all data sources
- **Scalable** in adapting bandwidth to data content
- No need for meteorological frequency allocation
- **IP** over **DVB** standard coding
- Use of **standard formats** (XRIT, BUFR, HDF, GRIB, ....)
- **Secure access control** at individual file and User level

# DVB-S dissemination within IGDDS

## building on EUMETCast



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# GSICS overview

- **Global Space-based Inter-Calibration System :**  
A *comprehensive strategy for satellite calibration* to ensure comparability of different satellite measurements provided at different times, by different instruments under the responsibility of different satellite operators.
- Initiated by **WMO and CGMS** and supported by **CEOS, GCOS and ITSC**
- It involves :
  - Pre-launch and on-board calibration
  - Calibration against external targets
  - **Satellite instruments cross-calibration (satellite collocations or time series overlap)**
  - Comparison with in situ measurements (radio-sondes and surface-based reference sites, and airborne campaigns)

# GSICS status and initial focus

- Implementation Plan adopted on June 2006
- First Executive Panel meeting in October 2006
  - Chair: Dr Mitch Goldberg (NOAA/NESDIS)
- Research Working Group planned to meet end 2006
- NOAA/NESDIS to host GSICS Coordination Centre
- Initial focus:
  - IASI validation
  - Methodology for LEO to LEO and GEO to LEO collocations
  - Desert sites for visible calibration
  - Use of AIRS and IASI as reference for IR sounders or Imagers
  - Definition of reference for MW imagers
  - ...

# Initial objectives regarding LEO to LEO comparison based on current/planned NOAA activities

"Historical " time series overlap	Instrument collocation
HIRS/HIRS MSU/MSU AMSU/AMSU SSMI/SSMI	<b>Current satellites</b>
	HIRS/AIRS AVHRR/AIRS AIRS/MODIS SSMI/AMSU TMI/AMSU
	<b>Future satellites</b>
	AIRS/IASI AMSR/FY-3



# Conclusions

- **RARS approach**
  - Valuable trade-off between coverage/timeliness
  - To collect Metop/MHS data and potentially other LEO data
- **DVB-S within IGDDS**
  - Cost-efficient data access
  - Can be considered for GPM data dissemination
- **GSICS initiative**
  - Will enhance and harmonize cross-calibration
  - Should benefit to MW imagers in GPM constellation





*Thank you ...*

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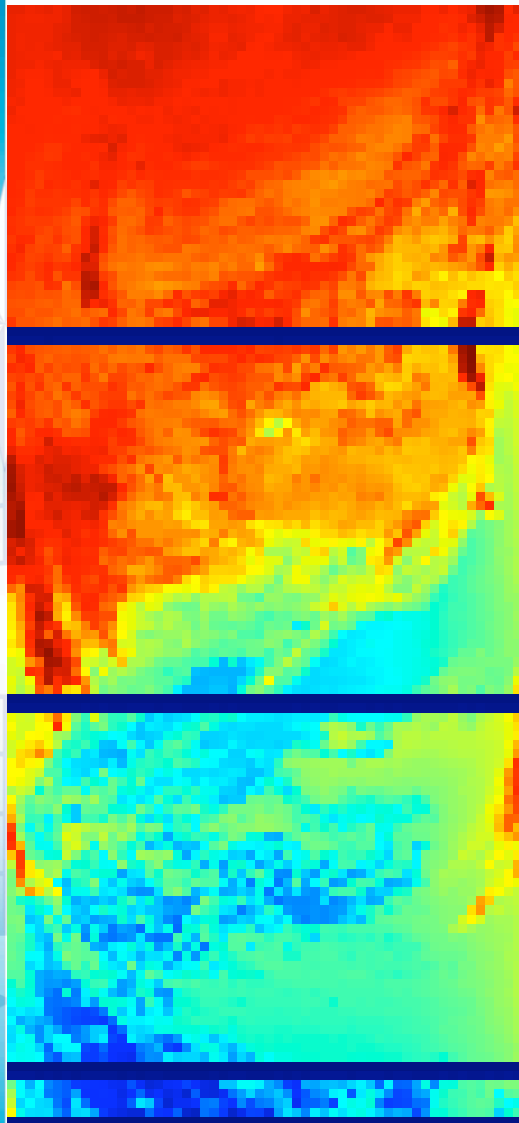
# Back-up slides

# EARS ATOVS

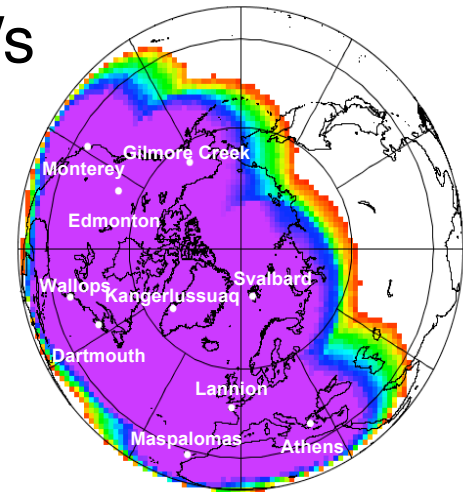
Satellites: NOAA-K,-L,-M, NOAA-N,-N'  
Metop

Instruments: HIRS, AMSU-A,  
AMSU-B, MHS

Data Rate: ~10 kb/s



HIRS data visualised using EPSView



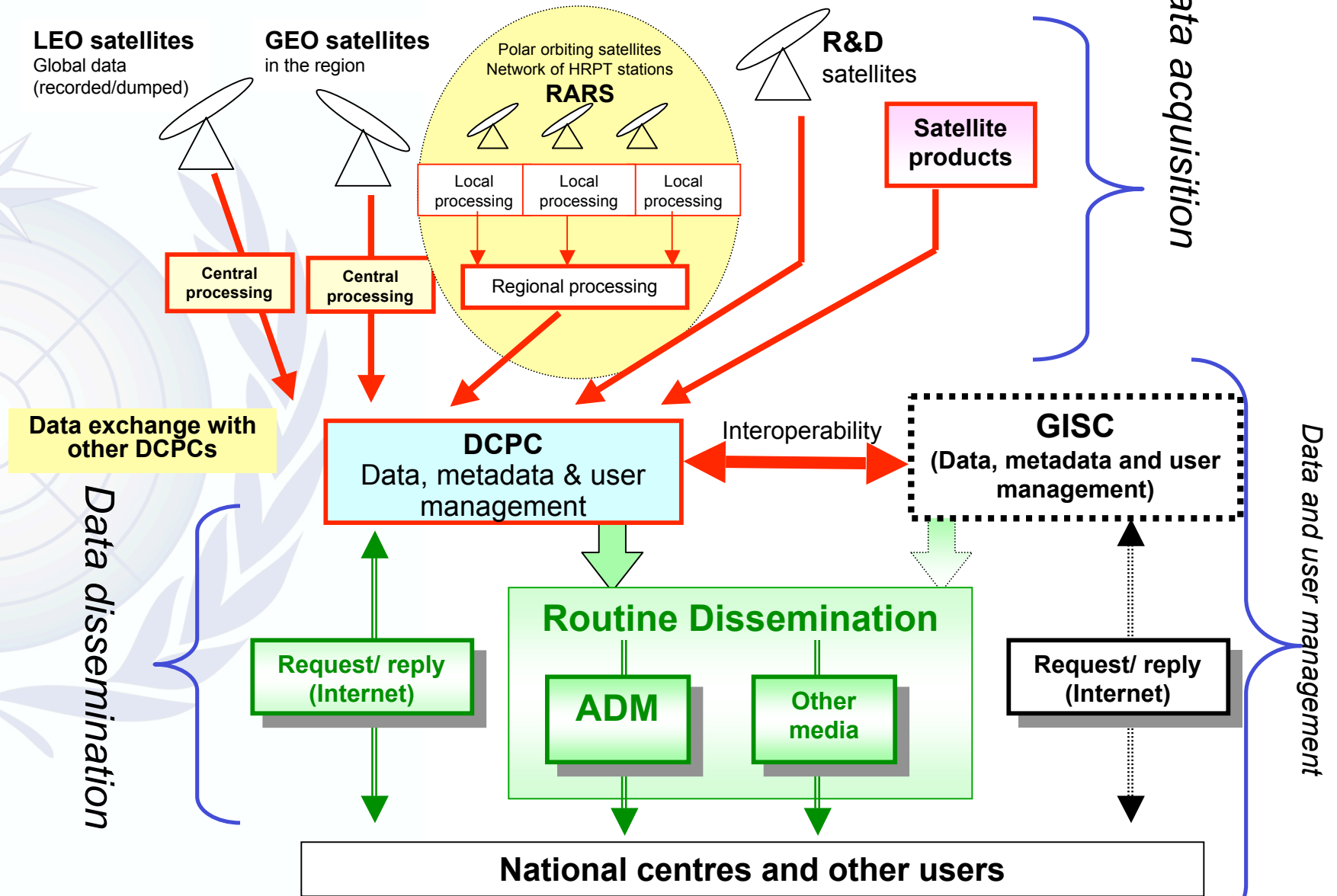
# Asia-Pacific RARS (2)

<b><i>Processing or Dissemination Centre</i></b>	<b><i>HRPT stations providing ATOVS data</i></b>	
	<b><i>September 2006</i></b>	<b><i>To be added December 2006</i></b>
<b>Tokyo</b>	Tokyo-Kiyose Syowa (Antarctica) Seoul Beijing Guangzhou Urumiqi	
<b>Melbourne</b>	Melbourne (x 2) Darwin Perth	Singapore Vladivostok Honolulu New Zealand Hong Kong

# Next Steps

- CGMS 34, 2-7 November, Shanghai
- CBS, 9-16 November, Seoul
- 4<sup>th</sup> RARS-IGDDS Implementation workshop in June 2007 (location TBD)

# IGDDS within the WIS



# Purpose and background of RARS Network

- To improve availability and timeliness of time-critical polar-orbiting satellite data for the global domain in order to fulfill global and regional requirements
- To take advantage of Direct Broadcast (timeliness) without the limitations of single local acquisition area
- The global RARS network is building on the EUMETSAT ATOVS Retransmission Services ([EARS](#))

# RARS objectives

- **Timeliness** : near-global data are available within **30 minutes** (instead of 2-3 hours) in NWP centers through GTS and/or Alternative Dissemination Means (ADMs)
  - potentially reduced to 10 minutes with data segmentation for some instrument data
- **Data quality and consistency:**
  - Use of common pre-processing software (AAPP)
  - Standardization of products formats, quality tagging and service management
  - Data monitoring with support of EUMETSAT SAF on NWP
- **Cost effectiveness**
  - few HRPT stations needed to ensure near-global coverage
  - telecom costs for data concentration are decreasing
  - GTS or ADMs allow low-cost access



# MHS channels

